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RADIATION REGULATIONS, STANDARDS, AND GUIDANCE

INTRODUCTION

EPA's Radiation Program protects the public and the environment from harmful exposure to radiation.

This brochure provides summaries of regulations, standards, and guidance that apply to radiation protection activities administered by the Program. Each summary includes a brief description of the document, as well as applicable statutory authorities and Federal Register citations. Please refer to the Federal Register citations listed in this brochure or contact the Radiation Protection Division for more detailed information.

Drinking Water Regulations

Primary Drinking Water Regulations: Radionuclides (40 CFR 141) - This regulation establishes maximum contaminant levels for radionuclides in community water systems. It addresses both natural and man-made radioactivity, specifies methods and frequency of monitoring, and identifies calculation methodologies to determine concentrations.

***Maximum Contaminant Levels*:** (1) 5 pCi/l combined for radium-226 and radium-228; (2) 15 pCi/l for gross alpha particle activity (including radium-226, but excluding radon and uranium); (3) annual dose equivalent to the total body or any internal organ not to exceed 4 mrem/yr from beta particle and photon radioactivity from man-made radionuclides; (4) 20,000 pCi/l for tritium; and (5) 8 pCi/l for strontium-90.

Authority: Public Health Service Act, as amended by the Safe Drinking Water Act

FR Citation: 41 FR 28402 (July 9, 1976)

Reportable Quantity for Radionuclides

Reportable Quantity Adjustment - Radionuclides (40 CFR 302 and 355) - Sections 103(a) and 103(b) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended, require that persons in charge of vessels or facilities from which a hazardous substance has been released, within a 24-hour period in a quantity equal to or greater than its reportable quantity (RQ), immediately notify the National Response Center of the release. CERCLA established an RQ of one pound for radionuclides. EPA, recognizing that an RQ of one pound may not be appropriate, promulgated this final rule to adjust the RQ for radionuclides (40 CFR 302) and administratively exempt from reporting certain radionuclide releases (40 CFR 355).

Radionuclide RQs: The RQs in Table 302.4 (40 CFR 302) are in units of pounds based on chemical toxicity. The RQs for all (approximately 1,500) radionuclides are in units of curies based on radiation hazard (40 CFR 302.4, Appendix B to Table 302.4). Whenever the RQs in Table 302.4 and Appendix B to the table are in conflict, the lowest RQ applies.

Exemptions from Radionuclide RQs: releases of radionuclides that (1) occur naturally in the soil from land holdings; (2) occur naturally from the disturbance of land for purposes other than mining; (3) occur from the dumping of coal and coal ash at utility and industrial facilities with coal-fired boilers; and (4) occur from coal and coal ash piles at utility and industrial facilities with coal-fired boilers.

Authorities: Comprehensive Environmental Response, Compensation, and Liability Act of 1980; and Clean Water Act

FR Citation: 54 FR 22524 (May 24, 1989)

WIPP Certification Decision

Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's (WIPP) Compliance With the Disposal Regulations: Certification Decision (40 CFR 194) - EPA certifies in this regulation that the WIPP will comply with the radioactive waste disposal standards at 40 CFR 191. EPA's certification decision establishes certain conditions that the Department of Energy (DOE) must meet to maintain a certification for the WIPP and before shipping waste for disposal in the WIPP. This certification constituted final approval for shipment of certain transuranic wastes from specific waste streams from Los Alamos National Laboratory for disposal at the WIPP, and specified a process by which the remaining waste generator sites in the DOE complex could be approved by EPA to ship their waste to WIPP as well.

Certification Standards: See 40 CFR 191, Environmental Radiation Protection Standards for the Management and Disposal of Spent Nuclear Fuel, and High-Level and Transuranic Radioactive Wastes.

Authorities: WIPP Land Withdrawal Act of 1992, as amended; and Atomic Energy Act of 1954, as amended

FR Citation: 63 FR 27354 (May 18, 1998)

WIPP Compliance Criteria

Criteria for the Certification and Recertification of the Waste Isolation Pilot Plant's Compliance with the 40 CFR Part 191 Disposal Regulations (40 CFR 194) - In this regulation, EPA issued criteria to determine if the WIPP will comply with the disposal standards of Subparts B and C of 40 CFR 191, Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level, and Transuranic Radioactive Wastes. These criteria apply the Agency's generic standards for the land disposal of certain radioactive wastes, specifically for the WIPP, which is a deep geologic repository. This regulation establishes criteria for general containment, assurance requirements, and individual and ground-water protection requirements.

Authorities: WIPP Land Withdrawal Act of 1992, as amended; Atomic Energy Act of 1954, as amended; and Department of Energy National Security and Military Applications of Nuclear Energy Authorization Act of 1979

FR Citation: 61 FR 5224 (February 9, 1996)

Emission Standards for Hazardous Air Pollutants

National Emission Standards for Hazardous Air Pollutants; Radionuclides (40 CFR 61) - In December 1989, EPA issued final decisions on radionuclide National Emission Standards for Hazardous Air Pollutants (NESHAPs) for eight source categories or subparts.

Radionuclide Emissions Standards

Subpart B, Underground Uranium Mines: an effective dose less than 10 mrem/year.

Subpart H, Department of Energy (DOE) Facilities: an effective dose (other than radon) of less than 10 mrem/yr.

Subpart I, Certain Non-DOE Federal Facilities: an effective dose of less than10 mrem/yr and an effective dose from iodine of less than 3 mrem/yr.

Subpart K, Elemental Phosphorus Plants: polonium-210 emissions from calciners and modulizing kilns not to exceed a total of 2 Ci/yr.

Subpart Q, DOE Facilities Radon Emissions: emissions less than 20 pCi/m^2-s of radon-222 as an average for the entire source.

Subpart R, Radon from Phosphogypsum Stacks: emissions of less than 20 pCi/m^2-s of radon-222 into the air from stacks.

Subpart T, Non-Operational Uranium Mill Tailing Piles: for disposal in uranium mill tailings piles that are no longer operational, emissions must be less than 20 pCi/m^2-s of radon-222 into the air. Subpart T is still in effect for DOE facilities, but has been rescinded for NRC licenses.

Subpart W, Operating Uranium Mill Tailing Piles: limits radon-222 emissions rate to 20 pCi/m^2-s.

Authority: Clean Air Act

FR Citation: 54 FR 51654 (December 15, 1989)

Standards for Spent Nuclear Fuel, High-Level and Transuranic Wastes

Environmental Standards for the Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes (40 CFR 191) - This rule establishes generally applicable environmental standards for the management and land disposal of spent nuclear fuel and high-level and transuranic radioactive wastes. This rule limits the radiation exposure of members of the public from the management and storage of spent nuclear fuel or high-level or transuranic wastes, and establishes several different types of requirements for disposal of these materials. It applies to wastes generated by both commercial and government sponsored and controlled activities. This regulation was issued in final form on December 20, 1993.

Management and Storage Standards: radioactive discharges not to exceed 25 mrem to the whole body and 75 mrem to the thyroid and 25 mrem to any other critical organ (40 CFR 191.03(a) or 25 mrem to the whole body and 75 mrem to any critical organ (40 CFR 191.03(b)).

Disposal Standards: disposal systems for waste and any associated radioactive materials shall be designed to provide reasonable expectation that for 10,000 years after disposal, the annual committed effective dose is not to exceed 15 mrem to any member of the public in the accessible environment.

Groundwater Standards: Disposal shall not cause the levels of radioactivity in any underground source of drinking water in the accessible environment to exceed 5 pCi/l for radium-226 and radium-228 combined; 15 pCi/l for gross alpha particle activity (including radium-226 but, excluding radon and uranium); and for beta particle and photon radioactivity, not to exceed an annual dose equivalent to the total body or any organ of 4 mrem a year (40 CFR 141).

Containment Requirements: limit the projected cumulative releases of radioactivity to the environment for 10,000 years after disposal.

Authorities: Atomic Energy Act of 1954; Nuclear Waste Policy Act of 1982; WIPP Land Withdrawal Act of 1992, as amended; and Reorganization Plan No. 3, 1970, as amended.

FR Citations: 50 FR 38066 (September 19, 1985); 58 FR 66398 (December 20, 1993); and 41 FR 28402 (July 9, 1976)

Nuclear Power Operations

Environmental Radiation Protection Standards for Nuclear Power Operations (40 CFR 190) - This standard specifies the levels below which normal operations of the uranium fuel cycle are determined to be environmentally acceptable.

Standards for Normal Operations

(1) the annual dose equivalent does not exceed:

- 25 mrem to the whole body
- 75 mrem to the thyroid
- 25 mrem to any other organ for any member of the public as the result of exposures to planned discharges of radioactive materials, radon and its daughters excepted, to the general environment.

(2) Release to environment contains less than:

- 50,000 Ci of krypton-85
- 5 mCi of iodine-129
- 0.5 mCi combined of plutonium-239 and other alpha-emitting transuranic radionuclides with half-lives greater than one year.

These limits apply to the entire uranium fuel cycle per gigawatt-year of electrical energy produced.

Authority: Atomic Energy Act of 1954, as amended; and Reorganization Plan No. 3, 1970

FR Citation: 42 FR 2858 (January 13, 1977)

Uranium and Thorium Mill Tailings

Health and Environmental Standards for Uranium and Thorium Mill Tailings (40 CFR 192) - EPA issued health and environmental standards to govern stabilization, control, and cleanup of residual radioactive materials at both operational and inactive uranium and thorium processing sites.

Controlling Residual Radioactivity: Comparable provisions apply to both uranium and thorium byproduct materials. For uranium wastes following site closure, these standards are designed to be effective for up to 1,000 years, to the extent reasonably achievable, and, in any case, for at least 200 years; provide reasonable assurance that releases of radon-222 from residual radioactive material to the atmosphere will not exceed an average release rate of 20 pCi/m^2-s, and meet groundwater protection standards.

Cleanup Standards for Land and Buildings: remedial actions shall be conducted so as to provide reasonable assurance that, as a result of residual radioactive materials from any designated processing site:

> ***Cleanup Standards for Land***: radium-226 (at uranium sites) or radium-228 (at thorium sites) in land averaged over any area of 100 square meters shall not exceed background by more than 5 pCi/g in the 15 cm surface layer and 15 pCi/g in any 15 cm layer below the surface layer.

Cleanup Standards for Buildings: remedial actions shall be conducted so as to provide reasonable assurance that the annual average (or equivalent) radon decay product concentration (including background) shall not exceed 0.02 Working Level (WL) and, in any case, the radon decay product concentration (including background) shall not exceed 0.03 WL; and the level of gamma radiation shall not exceed the background level by more than 20 mR/hr.

In November 1993, EPA amended 40 CFR 192 to establish compliance and closure schedules. In January 1995, EPA amended 40 CFR 192 to establish final ground water standards that are consistent with, but not identical to, RCRA requirements.

Authority: Atomic Energy Act of 1954, as amended by §206 of the Uranium Mill Tailing Radiation Control Act of 1978

FR Citations: 48 FR 590 (January 5, 1983); 48 FR 45926 (October 7, 1983); 58 FR 60340 (November 15, 1993); and 60 FR 2854 (January 11, 1995)

Yucca Mountain Public Health and Safety Standards

Public Health and Environmental Radiation Protection Standards for Yucca Mountain, Nevada (40 CFR 197) - Under the direction of §801 of the Energy Policy Act of 1992, EPA developed public health and safety standards for radioactive materials (including spent nuclear fuel and high-level radioactive waste) stored or disposed of at the potential Yucca Mountain repository. The Department of Energy must demonstrate compliance with the standards set forth in 40 CFR 197 to be granted a license by the NRC to receive and possess radioactive material at the Yucca Mountain site.

Storage Standards

Public Health and Safety Standards: exposure is not to exceed more than an annual committed effective dose equivalent of 15 mrem for any member of the public in the general environment.

Disposal Standards

Compliance with the disposal standards is achieved by demonstrating a reasonable expectation of meeting the specified limits.

Individual Protection Standards: for 10,000 years following disposal, exposure is not to exceed an annual committed effective dose equivalent of 15 mrem to the reasonably maximally exposed individual (RMEI).

Human Intrusion Standards: for 10,000 years following disposal, exposure is not to exceed more than an annual committed effective dose equivalent of 15 mrem to the RMEI as a result of human intrusion.

Ground Water Protection Standards: for 10,000 years of undisturbed performance after disposal, releases of radionuclides will not cause the level of radioactivity in the representative volume of ground water in the accessible environment to exceed:

(1) 5 pCi/l for combined radium-226 and radium-228 (including natural background);

(2) 15 pCi/l for gross alpha activity (including radium-226, but excluding radon and uranium, and including natural background); or

(3) 4 mrem per year to the whole body or any organ from combined beta and photon emitting radionuclides.

Authority: Energy Policy Act of 1992

FR Citation: 66 FR 32074 (June 13, 2001)

Standards for Disposal of Low-Activity Mixed Waste

Environmental Radiation Protection Standards for the Disposal of Low-Activity Mixed Radioactive Waste (40 CFR 193) - These standards would establish conditions under which mixed waste may be disposed of in Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste landfills. Mixed waste is regulated as hazardous under RCRA and as radioactive under the Atomic Energy Act. The standard limits the risk for mixed waste disposed at RCRA facilities. These limits are derived from exposure levels that are consistent with other EPA standards for protection.

Disposal Standards: Exact form of standard to be determined.

Authority: Atomic Energy Act of 1954, as amended

FR Citation: Not Yet Available

GUIDANCE *sets forth recommendations for setting radiation standards, developing regulations, or achieving public health protection*

Diagnostic X-Rays

Radiation Protection Guidance to Federal Agencies for Diagnostic X-Rays - This guidance sets forth 12 recommendations for reducing radiation exposure from the use of diagnostic x-rays. These recommendations, transmitted to the President jointly by EPA and the Department of Health, Education, and Welfare, were based on two guiding principles: avoidance of unnecessary prescription of x-rays and use of good technique to minimize radiation exposure.

Authority: Atomic Energy Act of 1954, as amended

FR Citation: 43 FR 4377 (February 1, 1978)

Occupational Exposure

Radiation Protection Guidance to Federal Agencies for Occupational Exposure (January 1987) - This guidance establishes general principles for the radiation protection of workers and specifies the dose limits for occupational exposure. It applies to all workers who are exposed to radiation in the course of their work, either as employees of institutions and companies subject to Federal regulation, or as Federal employees.

Authority: Atomic Energy Act of 1954, as amended

Citations: Radiation Protection Guidance to Federal Agencies for Occupational Exposure (January 27, 1987); and 52 FR 2822 (January 27, 1987)

WIPP: Management and Storage of Transuranic Waste

Guidance for the Implementation of EPA's Radiation Protection Standards for Management and Storage of Transuranic Waste (40 CFR Part 191, Subpart A) at the Waste Isolation Pilot Plant - EPA developed this guidance to implement radiation protection standards for management and storage of transuranic radioactive waste at the WIPP. The WIPP, a disposal site, is subject to EPA's generic standards for radioactive waste management and storage found in 40 CFR 191, Subpart A, during its operational phase. This guidance describes how EPA intends to implement the generally applicable Subpart A standard at WIPP, taking into account the facility's technical and operational characteristics. Topics discussed in this guidance include general compliance issues, emissions and environmental monitoring, reporting and record keeping, and determination of noncompliance.

Authority: Atomic Energy Act of 1954; Nuclear Waste Policy Act of 1982; WIPP Land Withdrawal Act of 1992, as amended.

Citations: Guidance for the Implementation of EPA's Standards for Management and Storage of Transuranic Waste (40 CFR Part 191, Subpart A) at the Waste Isolation Pilot Plant, EPA 402-R-97-001; and 62 FR 9188 (February 28, 1997).

Protective Action Guides

Manual of Protective Action Guides and Protective Actions for Nuclear Incidents (1992) - EPA developed this manual to assist state and local officials in preparing emergency response plans and in making decisions during a nuclear incident. This manual provides radiological protection guidance that may be used for making decisions on protecting affected populations during any type of nuclear incident or radiological emergency, except nuclear war. It provides a general discussion of Protective Action Guides (PAGs) and presents PAGs for specific exposure pathways and associated time periods.

Protective Action Guides

Early Phase of Nuclear Incident	***Intermediate Phase of Nuclear Incident***
Evacuation/Sheltering: 1-5 rem	Relocation: ≥ 2 rem
Administer Stable Iodine: 25 rem	Apply Dose Reduction Techniques: <2 rem
	Human Food/Animal Feeds: See 47 FR 47073 or Chapter 3 of the PAG Manual
	Drinking Water: recommendations are under development

Authority: 47 FR 10758 (March 11, 1982)

Citation: Manual of Protective Action Guides and Protective Actions for Nuclear Incidents, EPA 400-R-92-001 (May 1992)

For More Information and Updates:

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